NAMI Montana
National Alliance on Mental Illness

Update on Montana State University's Center for Mental Health Research and Recovery - Alzheimer's Study Update

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Background:

Non-invasive brain stimulation techniques, including transcranial magnetic simulation (TMS), are proving to be safe and effective treatments for several psychiatric conditions, including treatment-resistant depression, post-traumatic stress disorder, and obsessive-compulsive disorder. Recent studies in Europe and Israel have revealed the effectiveness of TMS in improving cognitive function in dementias, particularly Alzheimer's disease (AD), which have led to the approval of TMS treatment of Alzheimer's disease in Europe.

However, Alzheimer's disease is similar to other neuropsychiatric disorders in which response to treatment (including response to TMS treatment) is highly variable, with some benefiting considerably more than others (Anderkov, 2014). To attempt to refine sub-populations of individuals with a particular condition who are likely to respond to specific treatments, research efforts are increasingly seeking to identify biological markers or "biomarkers" that predict response to specific treatments for various disorders. To date, most research has studied potential biomarkers in isolation for a potential relation to treatment outcomes. A more comprehensive, and potentially more powerful approach, would involve the simultaneous collection of multiple biomarkers that can be "fused" in data analysis. This approach joins two data modalities by leveraging complementary and distinct modality specific information (for example, electrophysiology and blood flow signal) in an integrated model that can detect within-subject covarying patterns (linkage) across modalities. These linkages may serve to identify biomarkers that provide improved disease-specific treatment.

At least two large, federally-funded projects are pursuing such data-fusion approaches to biomarker research, including the BSNIP study in schizophrenia and bipolar disorder and the EMBARC study in depression, with some initial positive findings already reported. The proposed study seeks to identify such biomarkers of response to TMS treatment in persons with dementia. Specifically, the purpose of the study is to answer the question of whether results from two measures of brain activity, electroencephalography (EEG) and functional near-infrared spectroscopy (fNIRS), can individually or in combination identify a "biosignature" of response to TMS treatment in individuals with mild to moderate Alzheimer's disease. If

identified, such a biosignature could be used to identify, for those with Alzheimer's disease, who most could benefit from TMS treatment, thereby enhancing the cost-effectiveness of this treatment.

Clinical Trial Summary

Clinical trial design: Open-label study: High-frequency bilateral prefrontal and parieto-temporal repeated transcranial magnetic stimulation (TMS) using the Brainsway H2-coil.

Target population of the clinical trial: 20 men and women aged 50-80 with Alzheimer's disease, meeting evaluable criteria (i.e., complete 6 weeks of treatment and the post-treatment assessment occurring immediately after the week 6 treatment).

Clinical trial location: The Western Montana Mental Health Center, Butte, MT.

Duration of study: 13 weeks for each subject [1 week for screening visit; 6 weeks of treatment (1 session/day and 5 sessions per week); and a follow-up visit, at which no additional treatment will be administered, will take place 6 weeks after the treatment period].

Study outcome measures (study endpoints): The primary outcome will be a test of association between fused electroencephalogram (EEG) and functional near infrared spectroscopy data (using Joint independent component analysis) and cognitive improvement scores on the ADAS-cog scale at the conclusion of 6 weeks of TMS treatment. Secondary endpoints include scores on the Clinical Global Impression-Change scale (CGI-C), PHQ-9, Alzheimer's Disease Cooperative Study-Activities of Daily Living Inventory (ADCS-ADL), and QoL:AD questionnaires.

Research product: A Magstim Rapid Transcranial Magnetic Stimulation device with an improved H2-coil, manufactured by Brainsway Ltd. (a full description of the research product is found in the investigator's brochure).